



soh
Au coeur de la technique

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LA PRISE EN COMPTE DES ASPECTS SOCIO-ORGANISATIONNELS ET HUMAINS

**How to take into account
Human & Organizational Factors
in nuclear design?**



Agenda



- 1. Our ambition**
- 2. What do HO Factors mean?**
- 3. How to integrate HO Factors in a design process?**
- 4. Taking into account HO elements in decisional committees – an example**
- 5. Conditions for the deployment in each engineering unit & department**

1. Our Ambition (1)

A « step by step » deployment

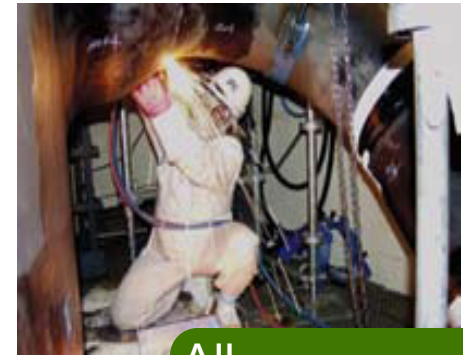
From HF experts
integrated into
programs...



N4 NPP
1985



EPR
1995



All
modifications
2006

... to the appropriation
by each design engineer
of the HO approach

1. Our Ambition (2)

In each engineering unit and department...



Every engineer in charge of a modification file, which has an impact on work activities, takes into account H&O Factors

Towards this aim:

- Every designer has been **trained**, he has **tools and methods**
- **Organization and Process**, in every unit, are developed in order to identify and manage the HO Factors in the files, and to pilot the approach, particularly to ensure the **skills**

1. Our Ambition (3)

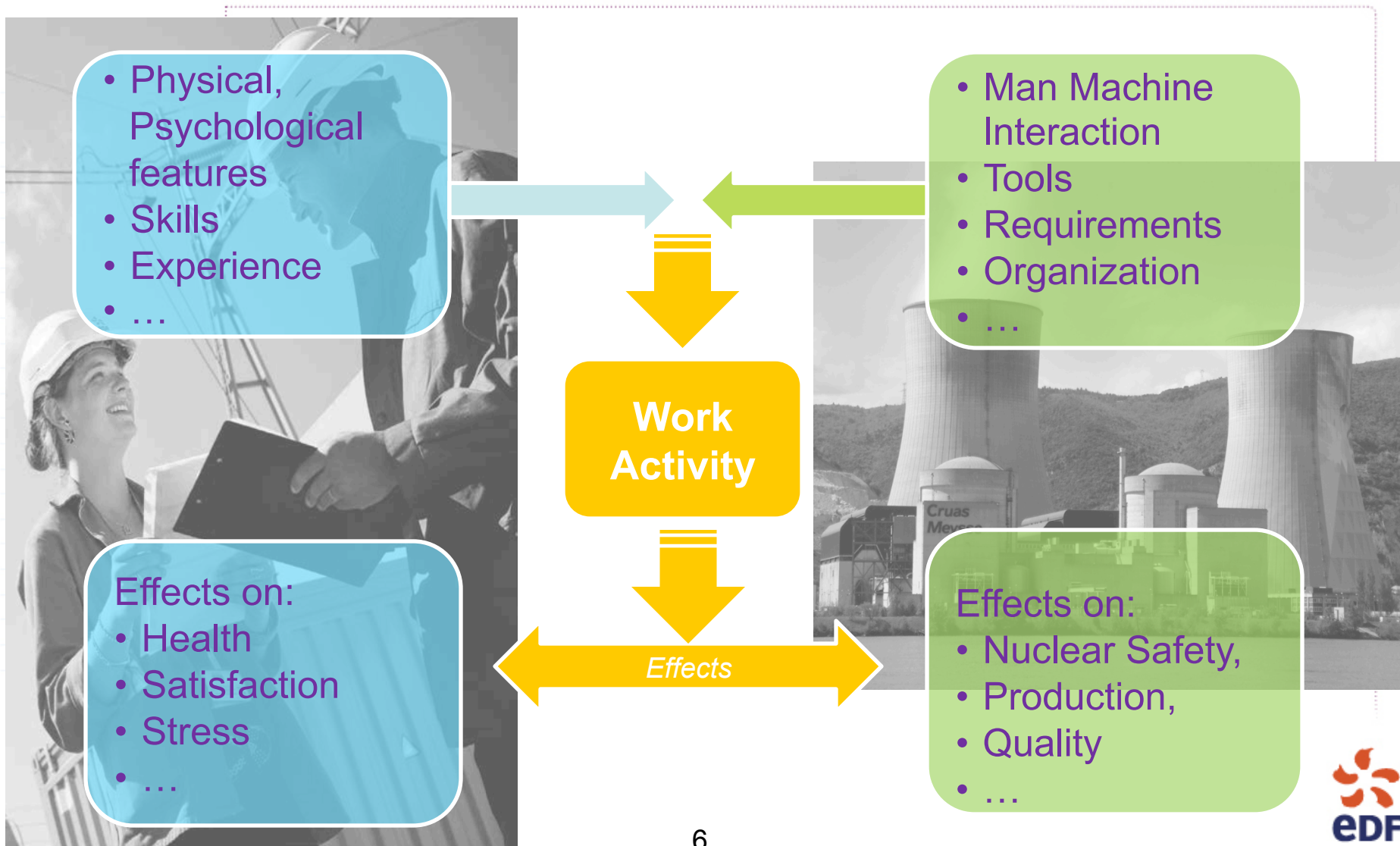
A deployment in a Nuclear Fleet with integrated engineering units and departments

4600 engineers for the modifications of 58 plants and for deconstruction
With the collaboration of suppliers



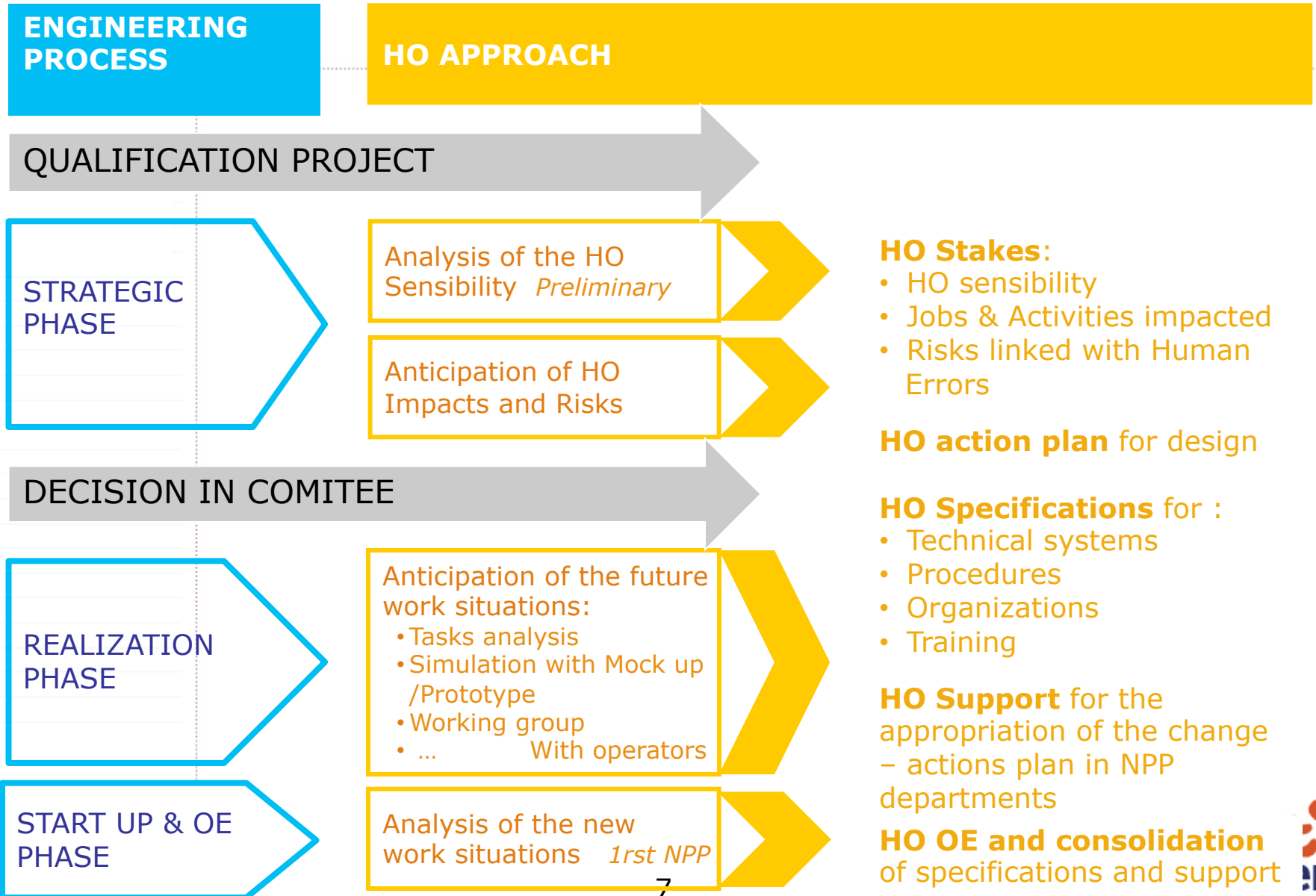
2. What do « HO Factors » mean?

“5 Scares figure of a work situation”, from Leplat & Cuny 1977



3. How to integrate HO Factors in a design process?

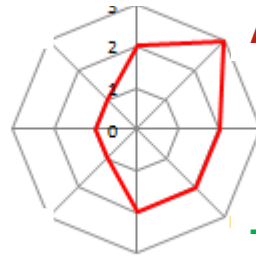
4 Key-steps of the HO approach



4. Taking into account HO elements in decisional committees - an ex.

HO Stakes:

Operation



Automation

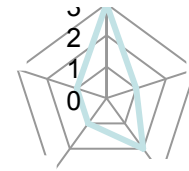
Renovation & digitalization of systems
New alarms

Centralization of maintenance supervision

Training Department

Safety & Quality Department

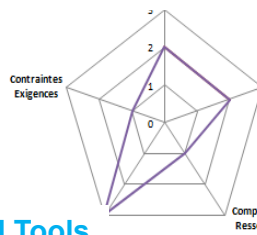
Nuclear safety



Production

HO Sensibility : **HIGH**

Method Practices Behavior

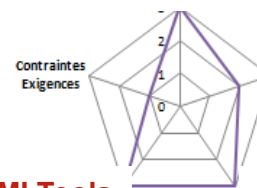


Organization Process Coordination

MMI Tools Documentation

Operation

Method Practices Behavior



Organization Process Coordination

MMI Tools Documentation

Skills Resources

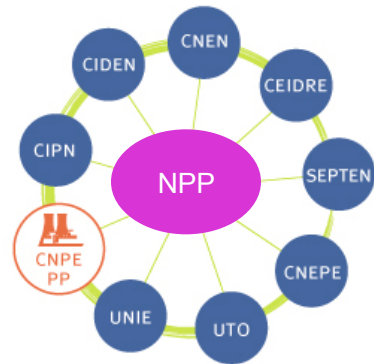
Automation

HO Action plan for design:

- MMI prototype, procedures - test and simulation with operators/ automation specialists
- Training simulator - simulation with automation specialists

5. Conditions for the deployment in each engineering unit and department

✘ **SO1 – Management:** A member of the direction team, HO trained, who pilots the deployment and assures the means – HO objectives for the unit



✘ **SO2 – Process:** HO approach integrated at the beginning, and at each step, presidents of committees who manage the HOs

✘ **SO3 – Skills:** An HO specialist who - supports engineers to develop the approach, helps them to use methods and tools, assesses the quality of the productions. Engineers well HO trained, with HO suppliers

✘ **SO4 – OE:** Knowledge of the reality based on the OE, meetings with operators, analyses of work situations produced by HO experts

In conclusion

What are the results today?

✘ **Engineering practices in evolution:**

- Designers who know better the reality of the field activities
- NPP better informed on the modifications, and more involved in the design choices
- A cooperation between designers and operators around the sharing of the activities

... towards, human and organizational centered systems